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REA Specification for Wood Crossarms (Solid and Laminated), Transmission Timbers and Pole Keys

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration

BULLETIN 1728H-701

SUBJECT: **REA Specification for Wood Crossarms (Solid and Laminated), Transmission Timbers and Pole Keys**

TO: All Electric Borrowers

EFFECTIVE DATE: September 2, 1993.

EXPIRATION DATE: Date of change of §1728.201 by rulemaking.

OFFICE OF PRIMARY INTEREST: Transmission Branch, Electric Staff Division.

PREVIOUS INSTRUCTIONS: This Bulletin replaces REA Bulletin 50-17, REA Specification for Wood Crossarms (Solid and Laminated), Transmission Timbers and Pole Keys, issued June 2, 1987.

FILING INSTRUCTIONS: Discard REA Bulletin 50-17 dated June 2, 1987, and replace with this bulletin. File with 7 CFR part 1728 and on REANET.

PURPOSE: This bulletin describes the minimum acceptable quality of wood crossarms permitted to be purchased by or for REA borrowers and the plans of procurement under which they may be purchased.

This bulletin is a "user friendly" reformat of the text codified in 7 CFR 1728.201 published at 58 FR 41394, dated August 3, 1993. Every effort has been made to ensure the accuracy of this document. However, in case of discrepancies, the regulation at 7 CFR 1728 section 1728.201 is the authorized source.

for John H. Cornesen
Administrator

August 13, 1993
Date

Instructions When Using REA Specification for Wood Crossarms (Solid and Laminated), Transmission Timbers and Pole Keys

i. Purpose: The intent of this specification is to provide a basis for procuring adequate crossarms. The borrower is responsible for completeness of an order.

ii. Scope: This specification establishes the minimum acceptable quality of wood crossarms, transmission timbers and pole keys to be used on distribution and transmission lines. The specification covers quality control, reserve treated stock inspection, material requirements, preservative treatment and related specifications.

iii. Information to be Completed by the Borrower: When using this specification the borrower or borrower's representative should enter into a writing agreement with a material supplier by way of contract or purchase order. This agreement should state that all crossarms shall be manufactured in strict accordance with this specification.

This agreement shall also contain a provision that specifically requires the producers to make the treating plant and storage areas available during normal business hours, in order for representatives of either the purchaser or REA to inspect such facilities to determine compliance with the standards and specifications.

a. The following information shall be provided on the purchase order or contract:

1. Quantity of material
2. Species
3. Preservative type and retention
4. Framing requirements or special drawings
5. Inspection method and inspection agency when desired.

b. This specification is written as the minimum acceptable requirements for material. This specification may be altered to increase the minimum requirements when borrowers so desire. Any alteration should be highlighted in the purchase order.

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ABBREVIATIONS

ACA Ammoniacal Copper Arsenate
ACZA Ammoniacal Copper Zinc Arsenate
AITC American Institute of Timber Construction
ANSI American National Standards Institute
APA American Plywood Association
AWPA American Wood-Preservers' Association
CCA Chromated Copper Arsenate
CuN Copper Naphthenate
WCLIB West Coast Lumber Inspection Bureau

DEFINITIONS

Arm refers to structural wood member used to support electrical conductors.

Certificate of Compliance shall consist of a certification over the signature of an authorized employee of the producer that the material shipped meets the requirements of this specification and any supplementary requirements cited in a contract or order under which it was purchased.

Crossarm is a term used interchangeably with arm.

Independent Inspection relates to examination of material by an independent inspector employed by a commercial agency.

Inspection means an examination of material in sufficient detail to insure conformity to all phases of the specification under which it was purchased.

Lot is a quantity of crossarms of like size, conditioning and fabrication usually making up one treating charge.

Producer is used to describe the party who manufacturers and treats crossarms.

Purchaser refers to either the REA borrower or contractors acting as the borrower's agent, except where a part of the specification specifically refers to only the borrower or the contractor.

Quality control designee refers to an individual designated by the producer to be responsible for quality control.

Reserve treated stock consists of timber products treated in accordance with this specification, prior to and in anticipation of the receipt of specific orders, and held in storage ready for immediate shipment.

Supplier is a term used interchangeably with producer or in some cases, may be distributor selling crossarms to the borrower.

Treating Plant is the organization that applies the preservative treatment to the crossarms.

Bulletin 1728H-701 to 7 CFR 1728.201 CROSS-REFERENCE

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1. SCOPE: This specification describes the minimum acceptable quality of wood distribution crossarms and transmission crossarms (hereinafter called crossarms) that are purchased by or for REA borrowers. Where there is conflict between this specification and any other specification referred to herein, this specification shall govern.

2. RELATED SPECIFICATIONS AND STANDARDS: The following listed specifications and standards are pertinent to this specification subject to the restriction in the Scope. All AWPA references are those in effect in AWPA Book of Standards 1991.

a. Standard No. 17 Grading Rules for West Coast Lumber, West Coast Lumber Inspection Bureau, 1991.

b. Standard Grading Rules for Southern Pine Lumber, Southern Pine Inspection Bureau, 1991.

c. AWPA P1-91, Standard for Coal Tar Creosote for Land and Fresh Water Use and Marine (Coastal Water Use)

d. AWPA P5-91, Standards for Waterborne Preservatives

e. AWPA P8-91, Standards for Oil-borne Preservatives

f. AWPA P9-91, Standard for Solvents and Formulations for Organic Preservative Systems

g. AWPA A1-91, Standard Methods for Analysis of Creosote and Oil-Type Preservatives

h. AWPA A2-91, Standard Methods for Analysis of Water-borne Preservatives and Fire-Retardant Formulations

i. AWPA A3-91, Standard Methods for Determining Penetration of Preservatives and Fire Retardants

j. AWPA A5-91, Standard Methods for Analysis of Oil-borne Preservatives

k. AWPA A6-89, Methods for Determination of Oil-Type Preservatives and Water in Wood

l. AWPA A7-75, Standard Wet Ashing Procedure for Preparing Wood for Chemical Analysis

m. AWPA A9-90, Standard Method for Analysis of Treated Wood and Treating Solutions by X-Ray Spectroscopy

n. AWPA A11-83, Standard Method for Analysis of Treated Wood and Treating Solutions by Atomic Absorption Spectroscopy

o. AWPA C1-91, All Timber Products - Preservative Treatment by Pressure Processes

p. AWPA C2-91, Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes

q. AWPA C25-89, Sawn Crossarms - Preservative Treatment by Pressure Process

r. AWPA C26-57, Standard for the Preservative Treatment of Crossarms by Nonpressure Processes, Douglas Fir, Western Larch, and Western Hemlock

s. AWPA C28-91, Standard for Preservative Treatment of Structural Glued Laminated Members and Laminations before Gluing of Southern Pine, Pacific Coast Douglas-Fir, Hemfir, and Western Hemlock by Pressure Process

t. AWPA M1-90, Standard for the Purchase of Treated Wood Products

u. AWPA M2-91, Standard for Inspection of Treated Timber Products

v. AWPA M3-81, Standard Quality Control Procedures for Wood Preserving Plants

w. AWPA M4-91, Standard for the Care of Preservative Treated Wood Products

x. Standard Grading Rules for Southern Pine Lumber and Special Products Rules for Structural, Industrial, and Railroad Freight Car Lumber, Southern Pine Inspection Bureau, 1991

3. GENERAL STIPULATIONS

3.1 Various requirements relating to quality control and inspection are to be found in REA Bulletin 1728H-702, "REA Specification for Quality Control and Inspection of Timber Products." These requirements shall be followed. Provisions of this bulletin and American National Standards Institute (ANSI) 05.2, 1983, "American National Standard for Wood Products - Structural Glued Laminated Timber for Utility Structures," which are positive in their wording <u>shall not</u> be interpreted or subjected to judgment by the quality control person or an independent inspector. <u>Judgment, although used by quality control personnel and independent inspectors, shall not be the basis for acceptance of material which does not conform to the minimum requirements of this specification</u>.

3.2 It is the responsibility of the producer to furnish material in accordance with this specification. Acceptance of an order under this specification constitutes acceptance of this responsibility. This responsibility remains notwithstanding any certificate (report) of inspection issued by an inspection agency or others. Acceptance of an order for material under this specification shall also constitute evidence of the producer's acceptance of this responsibility.

3.3 The methods of inspection described herein and in REA Bulletin 1728H-702, "REA Specification for Quality Control and Inspection of Timber Products," shall be used no matter which plan crossarms are produced under, i.e., Independent Inspection Plan, or Quality Assurance Plans. The number of crossarms actually inspected by monitors of quality control under a Quality Assurance Plan may vary from the number of crossarms inspected under the Independent Inspection Plan. Plans which are acceptable for supplying crossarms are described below.

3.3.1 **Independent Inspection Plan:** Under this plan, all crossarms supplied for use on an REA-financed system shall be inspected. The inspection shall be made by a qualified independent inspector in accordance with REA Bulletin 1728H-702, "REA Specification for Quality Control and Inspection of Timber Products."

3.3.1.1 The borrower has the prerogative to contract directly with the agency for the inspection service. The borrower should, where practical, select the inspection agency so that the inspector's continual employment is dependent only on performance acceptable to the borrower. The borrower shall be responsible for assuring that the independent inspection is properly performed. The selected agency shall not subcontract the service to any other agency without prior written consent by the borrower.

3.3.1.2 The producer shall not be a party to the selection of the agency by the borrower and shall not interfere with the work of the inspector except to provide notification of the readiness of material for inspection. When circumstances warrant, the producer may deal directly with the agency and with the purchaser. Under the Independent Inspection Plan, the producer shall not treat material before it has been properly inspected in the white, as evidenced by the inspector's hammer mark.

3.3.2 **Quality Assurance Plans:** The producer shall furnish crossarms conforming to this specification as monitored by a Quality Assurance Plan acceptable to REA. REA borrower groups or agents for borrower groups endeavoring to operate Quality Assurance Plans shall submit their plan for assuring quality control to the Director, Electric Staff Division, Rural Electrification Administration, Washington, D.C. 20250-1500, for specific approval prior to contracting with REA borrowers under such plans.

3.4 The producer shall provide the inspectors with full information (drawings, etc.) relating to the requirements contained in a contract or order which is supplementary to the requirements of this specification.

3.5 The borrower shall insure that the producer maintains or has access to adequate laboratory facilities at or very near the treating plant. All chemical tests, assays or analyses associated with the treatment shall be independently performed in this laboratory by both the quality control designee and the borrower's inspector. If acceptable to REA on a case-by-case basis, the producer may use a central laboratory.

3.6 Inspection and treatment of all timber products produced under this specification should be performed after receipt of the order from the purchaser, except as provided for in paragraph 11.1 (reserve treated stock).

3.7 The borrower shall insure that each inspection agency maintains its own central laboratory(ies) with a qualified staff capable of completely analyzing the preservative and treatments for which they are inspecting. If acceptable to REA, this central laboratory may be used for the independent inspector's routine assays with results made available the next working day.

3.8 The testing and inspection of the lamination process shall be in accordance with American Institute of Timber Construction (AITC) 200-83, Inspection Manual.

3.9 With the exception of reserve treated stock, all invoices for treated timber products shall be accompanied, in duplicate, by a copy of the producer's Certificate of Compliance and either a copy of the Independent Inspection Report, or a Quality Assurance Plan Certificate. The certificate shall be presented to the purchaser with the invoice. For reserve treated stock, inspection reports shall be available from the inspection agencies. When shipped from reserve stock, the invoice shall bear an endorsement of this and a further certification by the shipper that the material meets the requirements of this specification and any supplementary requirements cited in the contract or order under which it is purchased.

3.10 Crossarms shall be warranted to conform to this specification. If any crossarm shall be found defective or nonconforming under this specification within one year after shipment to the borrower, it shall be replaced as promptly as possible by the producer. In the event of failure to do so, the purchaser may make such replacement and the cost of the crossarm, at destination, recoverable from the producer.

4. MATERIAL REQUIREMENTS

4.1 **Material and grade:** All crossarms furnished under this specification shall be free of brashy wood, decay, and insect holes larger than 3/32 of an inch, shall meet additional requirements as shown on specific drawings, and shall be made of the following:

4.1.1 Douglas-fir - conforming to the applicable crossarm provisions of paragraphs 170 and 170a or the applicable transmission arm provisions of paragraphs 169 and 169a of the 1991 Standard Grading Rules for West Coast Lumber No. 17. All references to Douglas-fir shall be that of coastal origin.

4.1.2 Southern Yellow Pine - conforming to the provisions of Dense Industrial Crossarm 65, as described in paragraph 31.2 in Southern Pine Inspection Bureau 1991 Special Product Rules for Southern Pine.

4.1.3 Laminated wood crossarms shall conform to ANSI 05.2-1983. Laminated arms shall have at least the same load carrying capacity as the solid sawn arm it replaces. The load carrying capacity of the laminated arms shall be determined by one of the procedures outlined in ANSI 05.2.

4.1.4 Borrowers may use alternative wood crossarms that are listed in REA Bulletin 1728C-100, "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers."

4.2 **Knots** - Only sound, firm and tight knots are allowed if well spaced. Slightly decayed knots are permitted, except on the top face, provided the decay extends no more than 3/4 inch into the knot and if the cavities will drain water when the arm is installed, if well spaced. Well spaced knots means that the sum of the sizes of all knots in any 6 inch of length of a piece must not exceed twice the size of the largest knot permitted. More than one knot of maximum permissible size must not be in the same 6 inch of length. Slightly decayed, firm or sound "Pin knots" (3/8 inch or less) are not considered in size, spacing or zone consideration. Knots are subject to the following limits on size and location:

KNOT LIMITS FOR DISTRIBUTION ARMS
DRAWING M-19 (SEE FIGURE 1, EXHIBIT A)
All Dimensions in Inches

Class of Knot and Location	MAXIMUM KNOT DIAMETER CLOSE GRAIN	MAXIMUM KNOT DIAMETER DENSE GRAIN
Round Knots		
Single Knot: Maximum Diameter		
Center Section*		
Upper Half	3/4	1
Lower Half	1	1-1/4
Elsewhere	1-1/4	1-1/2
Sum of Diameters in a 6 Inch Length, Max.		
Center Section		
Upper Half	1-1/2	2
Lower Half	2	2-1/2
Elsewhere	2-1/2	3

KNOT LIMITS FOR TRANSMISSION ARMS
(SEE FIGURE 2, EXHIBIT A)
All Dimensions in Inches

	MAXIMUM DIAMETER FOR SINGLE KNOT
POLE MOUNTING HOLE ZONE*	
UPPER HALF (inner zone)	3/4
UPPER HALF (outer zone)	1 for close grain 1-1/4 dense grain

OTHER LOCATIONS TRANSMISSION ARM SIZE**	NARROW FACE	WIDE FACE (TWO SIDES) EDGE	WIDE FACE (TWO SIDES) ALONG CENTERLINE
4-5/8 x 5-5/8 or less	1	1-1/4	1-1/4
5-5/8 x 7-3/8	1-1/4	1-3/8	1-7/8
3-5/8 x 9-3/8	3/4	1-3/4	2-1/4

*No knot shall be closer than its diameter to the pole mounting hole.

**For cross sections not shown, refer to grading rules.

4.2.1 Supplementary Limitations on Knots in Crossarms:

4.2.1.1 Knot clusters are prohibited unless the entire cluster, measured on the worst face is equal or less than the round knot allowed at the specific location.

4.2.1.2 Spike knots are prohibited in deadend (DE) arms. Any spike knot across the top face are limited to the equivalent displacement of a knot 3/8 inch deep on one face and the maximum round knots for its particular location on the worst face with a maximum width of 1 inch measured at the midpoint of the spiked section. Elsewhere across the bottom or side faces, spike knots shall not exceed 1/2 the equivalent displacement of a round knot permitted at that location provided that the depth of the knot on the worst face shall not exceed the maximum round knot allowed at that location.

4.2.1.3 Loose knots and knot holes shall drain water when the arm is normally installed. In the center section, upper half, they shall not be greater than 1/2 the dimensions of round knots. Elsewhere, they shall not be greater than the round knot dimension. They are prohibited in DE arms.

4.2.1.4 All knots except those "spike" knots intersecting a corner are to be measured on the least diameter of the knot.

4.2.1.5 A knot shall be considered to occupy a specific zone or section if the center of the knot (i.e., pith of knot) is within the zone or on the zone's boundary.

4.2.1.6 If a round or oval knot appears on two faces and is in two zones, each face shall be judged independently. When this does occur, average the least dimension showing on both faces. In Free of Heart Center (FOHC) arms, if a knot occurs on only one face, it is allowed to be 25 percent larger than its stated size.

4.2.1.7 Knot spacing: Two or more knots opposite each other on any face are limited by a sum not to exceed the size of a maximum single knot permitted for the location. On all four faces, all knots shall be well spaced.

4.2.1.8 Knots, a maximum of 5/8 inch in diameter may intersect pin holes in the center section. One inch diameter knots may intersect pin hole elsewhere.

4.3 Miscellaneous Characteristics, Features and Requirements:

4.3.1 Pitch and Bark Pockets: For distribution crossarms, on the top face, pockets are limited to 4 medium pockets in 8 foot arms and not more than 5 in 10 foot arms. Elsewhere a maximum of 6 medium pockets in 8 foot arms and 8 in 10 foot arms shall be permitted. Equivalent smaller pockets are permissible. An occasional large pocket is permissible.

4.3.2 Shakes: Prohibited

4.3.3 Checks: Prior to treatment on properly seasoned arms, single face checks shall not exceed an average penetration of 1/4 the depth from any face and are limited to 10 inches long on the top face, and 1/3 the arm length on the other faces. Checks shall not be repeated in the same line of grain in adjacent pin holes. The sum of the average depths of checks occurring in the same plane on opposite faces shall be limited to 1/4 the face depth.

4.3.4 Compression wood is prohibited on any face. It is permitted if wholly enclosed in the arm, more than 6 annual rings from the surface and not over 3/8 inch in width.

4.3.5 Insect holes larger than 3/32 inch are prohibited. Pin holes (i.e., not over 1/16 inch diameter) are allowed if scattered and not exceeding 10 percent of the arm girth.

4.3.6 Wane is allowed on one edge, limited to approximately 1 inch, measured across the corner. Outside of the top center section, an aggregate length not to exceed 2 feet may have wane up to 1-1/2 inches on an occasional piece on one or both edges. Bark is to be removed.

4.3.7 Prior to preservative treatment, crook, bow, or twist shall not exceed 1/2 inch in 8 foot arms and 5/8 inch in 10 foot arms.

5. MANUFACTURE

5.1 **All dimensions and tolerances** shall conform to those shown on the drawings in this bulletin or supplied with the order. Cross-sectional dimensions shall be measured and judged at about 1/4 the arm length, except when the defects of "skip dressing" or "machine bite or offset" are involved. Drawings supplied shall not exceed minimum dimensions and tolerances shown on the drawings in this specification.

5.2 **The lamination techniques** shall be as defined in ANSI 05.2-1983.

5.3 **Pin and bolt holes:** Holes shall be smoothly bored without undue splintering where bits break through the surface. The center of any hole shall be within 1/8 inch of the center-line locations on the face in which it appears. The holes shall be perpendicular to the starting and finishing faces.

5.4 **Shape:** The shape of the arms at any cross section except for permissible wane shall be as shown on the respective drawings. The two top edges may be chamfered or rounded 3/8 inch radius. The bottom edges may be slightly eased the entire length, 1/8 inch radius.

5.5 **Incising:** The lengthwise surfaces of Douglas-fir crossarms shall be incised. The incisions shall be approximately 1/4 inch deep, shall be reasonably clean cut and their spacing pattern shall insure uniform penetration of preservative.

5.6 **Workmanship:** All crossarms shall be first quality workmanship. Crossarms shall be dressed on four sides, although "hit and miss skips" may occur on two adjacent faces on occasional pieces. Five (5) percent of a lot or shipment may be 1/8 inch scant in thickness or width at the ends for a length not exceeding 6 inches, or may have 1/8 inch machine bite on offset.

6. PRESERVATIVES: The preservative shall be one of the following, whichever is specified in the purchase order. Substitution of one of these preservatives for the one ordered shall not be made except by authorization from the purchaser.

6.1 **Creosote** shall conform to requirements of AWPA Standard P1 when analyzed in accordance with the methods in AWPA Standard A1, sections 2, 3, 4, either 5 or 9, and 6.

6.2 **Pentachlorophenol** shall contain not less than 95 percent chlorinated phenols and shall conform to AWPA Standard P8 when analyzed in accordance with AWPA Standard A5 or A9. The hydrocarbon solvents for introducing the preservative into the wood shall meet the requirements of AWPA Standard P9 Type A, determined in accordance with reference ASTM standards for physical properties.

6.3 **Waterborne Preservatives:**

6.3.1 Ammoniacal Copper Arsenates (ACA) and Ammoniacal Copper Zinc Arsenate (ACZA) shall meet the requirements of AWPA Standard P5, when analyzed in accordance with methods in AWPA Standards A2, A9, or A11.

6.3.2 Chromated Copper Arsenates (CCA) shall meet the requirements of the one of the formulations given in AWPA Standard P5, sections 4, 5 or 6, and 10. Tests to establish conformity shall be made in accordance with AWPA Standards A2, A9, or A11.

6.3.3 Determinations of the required pH of treating solutions of the waterborne preservatives shown in AWPA Standard P5, section 10, shall be determined in accordance with AWPA Standard A2, section 8.

6.3.4 Waterborne preservatives are available either as oxides, which form non-ionizing chemical compounds in the wood, or as salts, which leave ionizing compounds as well as non-ionizing compounds in the wood. Salt formulations of a waterborne preservative are more corrosive to metal than the oxide formulation and may cause surface deposits. Unless otherwise

specified in the purchase order, the oxide formulations of waterborne preservatives shall be supplied. If visible surface deposits appear on the wood within the 1-year guarantee period, it shall not be in compliance with the specification and shall be replaced by the producer. See paragraphs 3.10 and 6.3.6.

6.3.5 Douglas-fir crossarms shall not be treated with CCA preservatives.

6.3.6 Treated materials with waterborne preservatives shall be free of visible surface deposits.

6.4 **Copper Naphthenate** (CuN) concentrate used to prepare wood preserving solutions shall contain not less than 6 percent nor more than 8 percent copper in the form of Copper Naphthenate and shall conform to AWPA Standard P8 when analyzed in accordance with AWPA Standard A5. The hydrocarbon solvents for introducing the preservative into the wood shall meet the requirements of AWPA Standard P9 Type A, determined in accordance with reference ASTM standards for physical properties.

7. CONDITIONING PRIOR TO TREATMENT

7.1 Unless ordered to a lower moisture content average, all solid sawn crossarms shall be made of lumber which has been kiln-dried. Douglas-Fir arms shall have an average moisture content of 19 percent or less, with a maximum not to exceed 22 percent in a single arm. Southern Yellow Pine arms shall have an average moisture content of 22 percent or less, with a maximum not to exceed 30 percent in a single arm.

7.2 The above moisture content levels to be measured at about 1/4 the length and at a depth of about 1/5 the crossarm's thickness. Additionally, the moisture content gradient between the shell (i.e., 1/4 inch deep) and the core (i.e., about 1 inch deep) shall not exceed five percentage points.

7.3 A minimum of at least 20 solid sawn crossarms per treating charge shall be measured to verify moisture content and duly recorded by the quality control designee and independent inspector.

7.4 The moisture content of lumber used in laminating shall, at the time of gluing, be within the range of 8 to 12 percent, inclusive.

8. PRESERVATIVE TREATMENT

8.1 All timber products treated under this specification shall be treated by either a pressure or a thermal (nonpressure) process and with the preservative specified in the order or contract.

8.2 These materials may be further conditioned by steaming, or by heating in hot oil (Douglas-fir), within the following limits:

	Time Hours (max.)	Temperature Deg.F (max.)
Steam	3	220
Heating in Preservative	3	210

8.3 A final steam or hot oil bath may be used only to meet cleanliness requirements of paragraph 9.5. Total duration of the steam bath shall not exceed 2 hours and the temperature shall not exceed 240°F.

9. RESULTS OF TREATMENTS

9.1 **The quality control designee** shall test or supervise the testing of each treated charge for penetration and retention, independent of any other sampling being performed.

9.2 **Method of Sampling:** When testing penetration and retention, a borer core shall be taken from not less than 20 crossarms in each treating charge. The borings shall be taken from any face except the top face at a location as close to the end as possible being at least 3 inches from the end of the arm and no closer than 3 inches from the edge of holes. The bored holes shall be plugged with preservative-treated plugs driven into the arm. Borings from laminated arms shall not be taken from the same laminate unless there is an end joint separation.

9.3 **Penetration** by the preservative, as determined in accordance with AWPA Standard A3, shall be 100 percent of the sapwood in crossarms. In the heartwood of Douglas-fir crossarms, the penetration shall be not less than 3 inches longitudinally from the edge of holes and ends, and at least 3/16 inch from the surface of any face.

9.4 **Retention of Preservative** requires minimum retention in the outer 6/10 of an inch assay zone for acceptance at the treating plant shall be not less than:

Preservative	Retention (pcf)	AWPA Analysis Method
Creosote	8	A6
Pentachlorophenol	0.4*	A5
ACA, ACZA or CCA	0.4	A2, A7, A9, or A11
Copper Naphthenate	0.04	A5, A9, or A11

*This retention is for the lime ignition method. The copper pyridine method, retention 0.36 pcf, is required when timbers may

have been in contact with salt water, and for all species native to the Pacific Coast region. It is not required when it specifically states on the rough sawn material invoice that this material has not been in contact with salt water or is shown by analysis that there are no additional chlorides present in the wood before treating.

9.5 **Cleanliness** of lengthwise surfaces of all crossarms shall be free from tarry, greasy, or sticky material and from oil exudation and pentachlorophenol crystallization (blooming).

9.6 **Retreatment** of materials which do not meet the penetration and retention requirements of this specification may be done only twice. Initial treatment steaming time plus retreatment steaming time, combined, shall not exceed time allowed in section 8.

10. MARKING

10.1 All crossarms shall be branded (hot brand) or die-stamped legibly and to a depth of approximately 1/16 of an inch before treatment. The letters and figures shall be not less than 1/2 inch in height. The top of the brand shall be oriented to the top of the arm. The brand or die-stamp shall include:

a. The manufacturer's identifying symbol.
b. Month and year of manufacture.
c. Species of timber:
   DF for Douglas-fir
   SP for Southern Yellow Pine
d. Preservative:
   C for Creosote
   P for Penta
   S for Salts
   N for Copper Naphthenate
e. Example:

M-6-72	Manufacturer - Month - Year
DF-P	Douglas-fir - penta treated

10.2 The brand or stamp shall be placed on either of the wide surfaces of the arms, oriented with letters right side up towards the top of the arm and preferably about 1 foot from the midpoint of the arm. The mark should be approximately the same location on all arms of the same type as produced by each producer.

11. STORAGE

11.1 Producers may treat material for reserve treated stock under any of the REA-approved plans cited in paragraph 3.3, but they must notify REA in advance of their intention to treat material for reserve treated stock. The notification must be submitted prior to initially treating material for reserve stock, and annually thereafter prior to the beginning of each calendar

year. The notification shall be addressed to the Director, Electric Staff Division, Rural Electrification Administration, Washington, D.C. 20250-1500.

REA will acknowledge each notification of intent to treat material for reserve treated stock under the REA specification. Borrowers or their contractors shall not purchase for borrower use reserve treated stock from plants that fail to comply with the above notification requirements. REA acknowledgement of the plant's advance notice of intention to treat material for reserve treated stock for the calendar year in question shall be evidence of compliance with the notification requirements. Producers shall inform REA of:

11.1.1 The locations of all storage or distribution yards where reserve treated stock will be maintained.

11.1.2 The designation of the REA-approved plan and the name of the selected inspection agency, where applicable, which is to be used to provide reserve stock. The producer shall notify REA promptly of any change in the plan or inspection agency.

11.2 Crossarms treated with oil borne preservatives which have been held in storage for more than 1 year, shall be reassayed before shipment to the borrower and shall be retreated if found nonconforming for retention (paragraph 9.4) on orders placed in accordance with this specification.

11.3 The crossarms shall meet the assay after retreatment in accordance with section 9.

11.4 Crossarms which are to be held in storage after final acceptance, shall be stacked in piles or on skids in such a manner as to assure good ventilation. The stacks shall be covered or stored indoors for protection from the sun and weather to reduce checking, bending, and loss of preservative.

12. DRAWINGS: The drawings, in Exhibit B for distribution crossarms have a type designation and show in detail the size, shape, and pattern of boring desired for crossarms ordered under this specification. Orders shall indicate the type desired. Crossarms shall be furnished in accordance with the details of these drawings or in accordance with drawings attached to purchase order or contract.

Drawing: Distribution Crossarms - M-19, Exhibit B, Pg. 22

Technical drawings for transmission crossarms are published in REA Bulletin 1728F-T805B (formerly 50-1), Electric Transmission Specifications and Drawings, 115kV through 230kv, and REA Bulletin 1728F-T805A (formerly 50-2), Electric Transmission Specification and Drawings, 34kV through 69kV. Appropriate drawings for transmission arms are to be specified and included with purchase orders.

13. DESTINATION INSPECTION: When cross sectional tolerances are measured at destination, normal shrinkage allowance shall be considered using the arm's current moisture content and actual size. Using the average shrinkage allowances for Douglas-fir and Southern Yellow Pine as one percent size change for each four point moisture content change below the fiber saturation point, calculations can be made to determine if the arm met the minimum size at time of manufacture, when the arm was to meet the average moisture content.

14. PURCHASE OF RELATED SPECIFICATIONS AND STANDARDS

All AWPA standards may be purchased from:

American Wood-Preservers' Association (AWPA)
P. O. Box 286
Woodstock, Maryland 21163-0286

Telephone (410) 465-3169

ANSI 05.2-1983, American National Standard for Wood Products - Structural Glued Laminated Timber for Utility Structures, may be purchased from:

American National Standards Institute
1430 Broadway
New York, New York 10018

Telephone (212) 642-4900

Standard Grading Rules for Southern Pine Lumber - 1991, and Special Products Rules for Structural, Industrial, and Railroad Freight Car Lumber, 1991, may be purchased from:

Southern Pine Inspection Bureau
4709 Scenic Highway
Pensacola, Florida 32502

Telephone (904) 434-2611

Standard Grading Rules for West Coast Lumber No. 17 - 1991, may be purchased from:

West Coast Lumber Inspection Bureau
P.O. Box 23145
Portland, Oregon 97223

Telephone (503) 639-0651
Fax (503) 684-8928

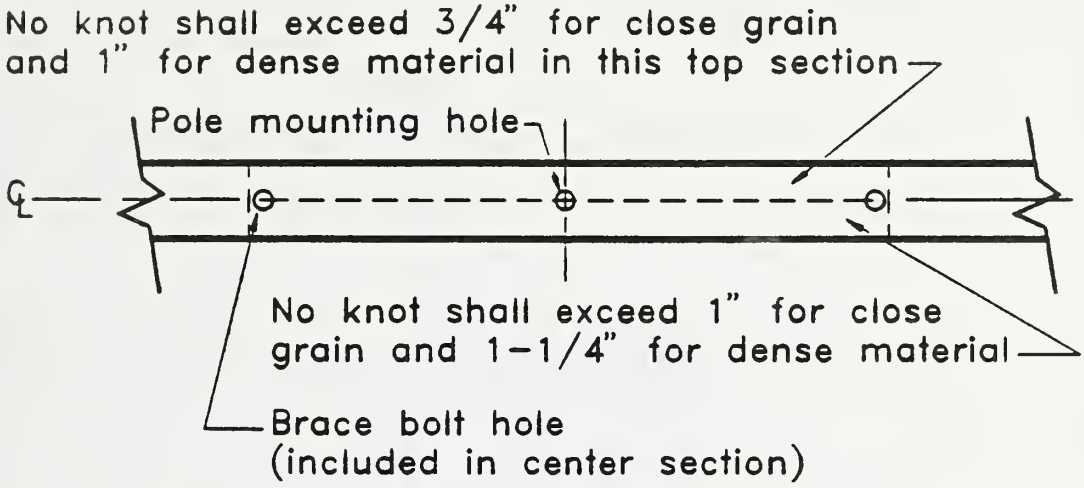
AITC 200-83 may be purchased from:

American Institute of Timber Construction
333 West Hampden Avenue
Englewood, Colorado 80110

Telephone (303) 761-3212

DISTRIBUTION ARMS

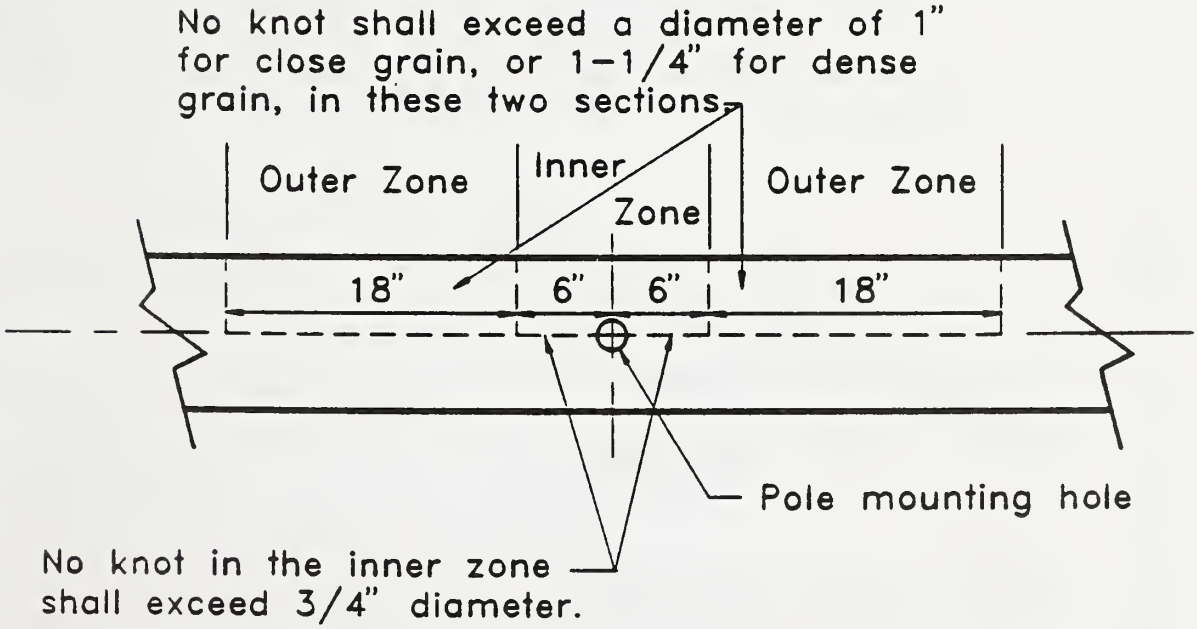
Figure 1



TRANSMISSION ARMS

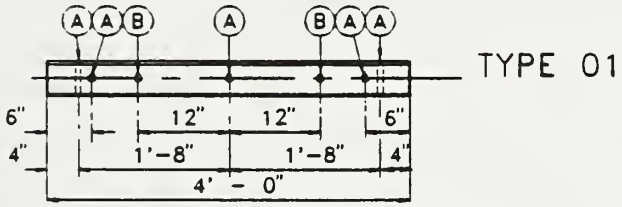
POLE MOUNTING HOLE ZONE

Figure 2

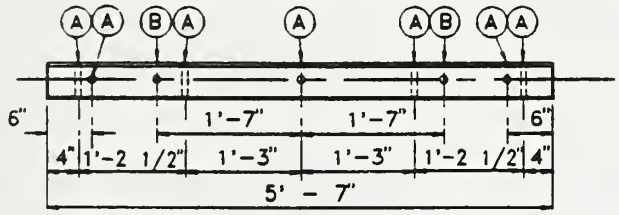


Crossarm Drilling Guide

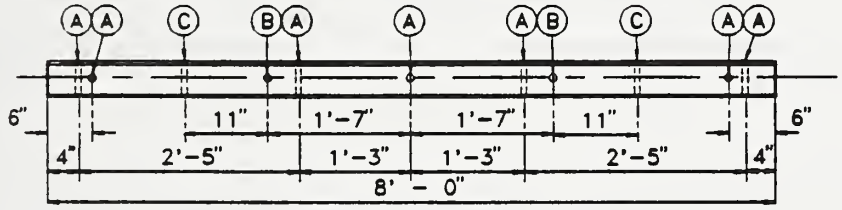
TOLERANCES AND SIZES OF HOLES			
NOMINAL		GO	NO GO
A	11/16"	5/8"	3/4"
B	7/16"	3/8"	1/2"
C	9/16"	1/2"	5/8"



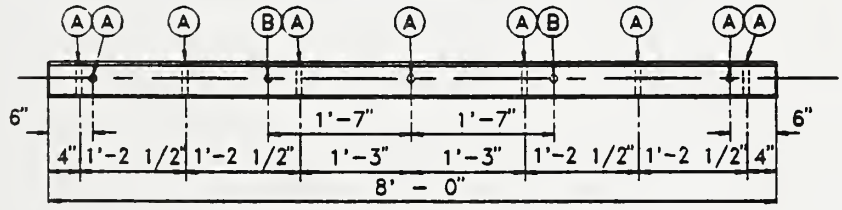
TYPE 01



TYPE 02



TYPE 03



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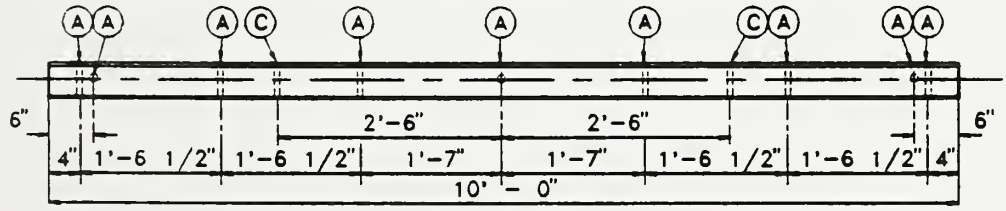
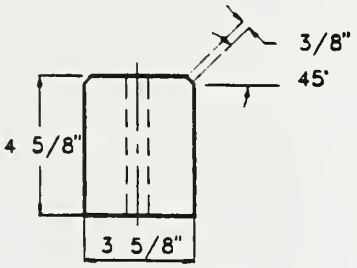


TYPE 05



TYPICAL END SECTION

NOTES:

1. Holes are to be located within ±1/8".
2. Length of the crossarm is to be within ±1/4"
3. The tolerance of the cross section is +1/8" and −0" at time of manufacture.
4. All holes are to be drilled on centerlines of crossarm faces.

CROSSARM DRILLING GUIDE

SCALE:	
N.T.S	M−19

METRIC CONVERSION FACTORS

TO CONVERT FROM	TO	MULTIPLY BY
foot (ft)	meter (m)	0.3048
inch (in)	centimeter	2.54
pound per cubic foot (pcf) (lb/ft^3)	kilogram per cubic meter (kg/m^3)	1.601846
pound per square inch (psi) (lb/in^2)	kilogram per square meter (kg/m^2)	703.0696
degrees Fahrenheit (X°F)	degrees Celsius (°C)	5/9(X°-32)